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The Effect of Self-Regulated Learning on Students' Learning Independence in Entrepreneurship Education

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ABSTRACT

This study aims to determine the effect of implementing Self-Regulated Learning (SRL) assisted by the Wadhwani Ignite Learning Management System (LMS) on students' learning independence in entrepreneurship courses at Universitas Syiah Kuala. A pre-experimental method with a one-group pretest-posttest design was employed, involving 72 students enrolled in entrepreneurship courses. Data were collected using a learning independence questionnaire administered before and after the intervention. SRL was implemented over seven meetings using Wadhwani Ignite LMS features, including learning materials, discussion forums, assignments, and online quizzes. Data were analyzed using the N-Gain test to measure improvements in students' learning independence. The results showed that the average pretest score increased from 64.25 to 82.70 in the posttest, with an N-Gain value of .52, categorized as moderate. The improvement was particularly evident in learning independence, self-management, learning motivation, and problem-solving skills. These findings indicate that SRL assisted by Wadhwani Ignite LMS can enhance students' learning independence and serve as an effective digital learning alternative in entrepreneurship education. The integration of SRL with an entrepreneurship-oriented LMS has implications for designing more effective learning environments that foster autonomous learning and lifelong learning competencies.

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1. INTRODUCTION

Learning independence and the ability to continue learning throughout life are one of the main assets in improving the quality of human resources and the nation's competitiveness in the era

of globalization (Taranto & Buchanan, 2020; Bittner, Roßnagel & Staudinger, 2022). The lifelong learning paradigm views that the learning process does not only take place in the classroom or at a certain level of education, but is a process that continues from a person is born to the end of life (Thwe & Kálmán, 2024). This concept places education as an open, flexible, and meaningful process for each individual to develop his or her potential in a sustainable manner (Lindqvist et al., 2024). Therefore, education is not only oriented to knowledge transfer, but also directed at character building, moral strengthening, creativity development, and life skills that are relevant to the needs of society and the world of work (Defitrika & Mahmudah, 2021; Malaikosa et al., 2022; Meutia et al., 2024). In the context of higher education, this paradigm demands a change in a more innovative and student-centered approach to learning (Lahdenperä, Rämö & Postareff, 2022). Students are no longer positioned as learning objects who only receive information from lecturers, but as active subjects who have responsibility for their own learning process. This approach is expected to be able to produce graduates who are independent, confident, creative, innovative, and have the ability to think critically in facing various life challenges. Thus, universities are required to continue to develop learning strategies that are more flexible and adaptive to technological developments and the needs of the times (Lahdenperä, Rämö & Postareff, 2022).

One of the important competencies that students must have in 21st-century learning is learning independence (Gambo & Shakir, 2021; Karatas & Arpacı, 2021). Learning independence is the ability of individuals to organize, control, and evaluate their learning process independently (Chitra et al., 2022; Keane et al., 2022; Klimova et al., 2022). Students who have high learning independence tend to be able to determine learning goals, manage time, find learning resources independently, and solve academic problems without full dependence on lecturers (Urbina, Villatoro & Salinas, 2021; Edisherashvili et al., 2022; Zhu & Doo, 2022). However, the reality on the ground shows that the level of student learning independence is still relatively low. Previous study has consistently reported that many university students demonstrate low levels of self-regulated learning, particularly in goal setting, self-monitoring, time management, and learning strategy use, indicating that they still rely heavily on instructor guidance rather than managing their own learning effectively (Edisherashvili et al., 2022). Many students still have difficulty expressing ideas independently, looking for problems for discussion material, or doing critical reasoning on a phenomenon. The learning process that has taken place so far emphasizes more on the "how" aspect of completing a task than on a deep understanding of the "why" of an important concept and how it is applied in real life (Hyytinen et al., 2024).

The low learning independence of students is also influenced by the dominant role of lecturers in the learning process (Schweder & Raufelder, 2022; Symonds, 2021). In general, students still think that a good lecturer is a lecturer who explains all the material systematically from the beginning to the end of the lecture, while students only play the role of recording the material (Li, 2021; Murphy et al., 2021). This condition causes students to be less active in exploring knowledge independently and less accustomed to developing critical thinking and problem-solving skills (Lahdenperä, Rämö & Postareff, 2022). This issue is particularly critical in entrepreneurship education, where students are expected to identify opportunities, make independent decisions, manage uncertainty, and develop innovative solutions through self-directed learning rather than relying solely on instructor guidance. Without sufficient learning independence, students may struggle to translate entrepreneurial concepts into practical business ideas and entrepreneurial actions. A similar phenomenon was also found in entrepreneurship courses at several faculties at Universitas Syiah Kuala. Entrepreneurship courses have a fairly wide scope of material, forming graduates who are independent, productive, adaptive, and have the ability to create added value for themselves and the

community. If all material is only delivered through face-to-face learning, then the achievement of learning objectives will be less than optimal, both in terms of understanding the material and developing student learning independence. Therefore, fostering learning independence is an essential prerequisite for achieving the intended learning outcomes of entrepreneurship education, including entrepreneurial mindset, creativity, opportunity recognition, and lifelong learning competencies.

The application of SRL in lectures is expected to train students to be independent, disciplined, and proactive. The application of Self-Regulated Learning (SRL) in higher education is intended to develop students who are independent, disciplined, proactive, and capable of managing their own learning process. According to (Zimmerman, 2002), SRL encompasses four key aspects: independence, self-management, awareness of learning, and problem solving. To foster independence, lecturers encourage students to complete learning tasks autonomously by assigning case studies that require individual analysis and evaluation, enabling students to recognize their strengths and weaknesses, develop learning plans, and assess their own performance without excessive reliance on lecturers. Self-management is promoted by encouraging students to establish study schedules, manage their time effectively, and create conducive learning environments outside the classroom, thereby strengthening their discipline, self-control, and motivation to achieve academic goals. Awareness of learning is developed by guiding students to identify their prior knowledge and learning needs before engaging with new topics, enhancing their metacognitive ability to recognize what they know, identify gaps in understanding, and set appropriate learning objectives. Finally, problem-solving skills are cultivated through problem-based learning activities and project assignments that require students to analyze challenges, identify their root causes, and apply appropriate strategies to overcome obstacles encountered during the learning process.

To overcome these limitations, a learning strategy is needed that is able to provide a wider space for students to learn independently. One of the alternatives that can be applied is the use of digital teaching materials and LMS-based learning (El-rumi, 2022). The use of LMS-based learning allows students to access learning materials anytime and anywhere, so that the learning process is no longer limited to face-to-face meetings in the classroom (Galvis & Carvajal, 2022). At Universitas Syiah Kuala, the implementation of LMS-based entrepreneurship learning in collaboration with the Wadhwani Foundation is one of the efforts to support digital-based learning and facilitate the development of student learning independence. Through this platform, students can study the material independently, access various learning resources, discuss online, and do assignments more flexibly.

The Wadhwani Foundation is a global non-profit organization founded in 2001. The organization focuses on entrepreneurship development, upskilling and innovation and job creation in developing countries. Wadhwani Foundation has a primary mission to accelerate economic growth through large-scale job creation and improvement of the quality of human resources. This organization collaborates with governments, universities, industry, and various educational institutions in many countries, including Indonesia. One of its key educational initiatives is the Wadhwani Ignite Learning Management System (LMS), which is specifically designed to support entrepreneurship learning through structured digital modules, interactive learning activities, self-paced learning, formative assessments, and real-world entrepreneurial case studies. These features encourage students to take greater responsibility for their own learning, monitor their progress, and apply entrepreneurial concepts in authentic contexts, making the platform particularly suitable for fostering self-regulated learning and learning independence. Wadhwani Foundation actively supports the development of student entrepreneurship (Figure 1).

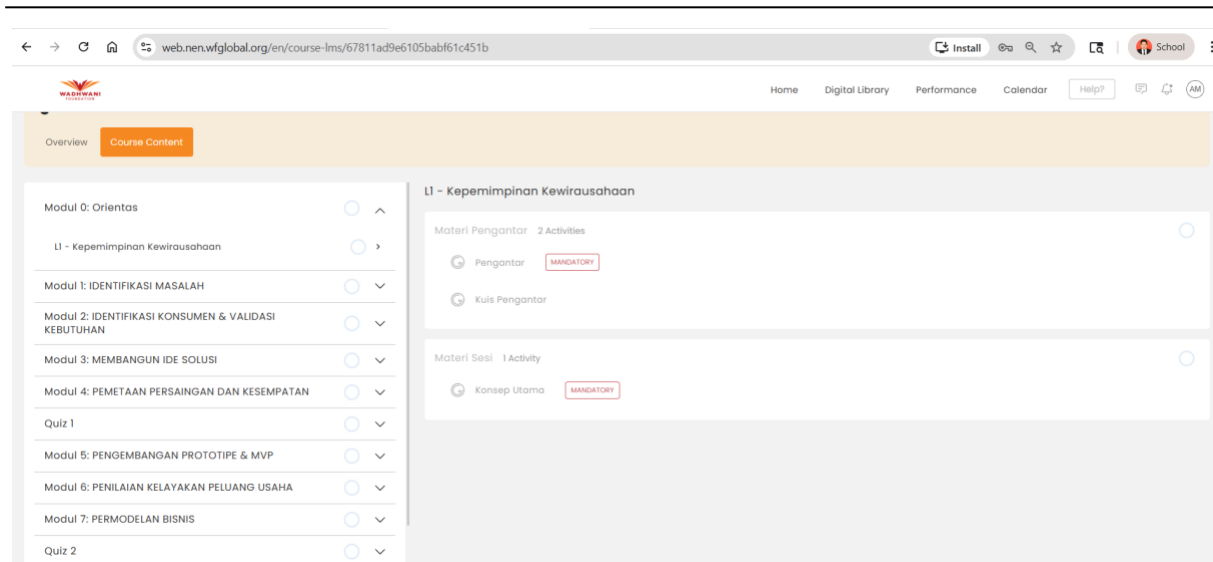


Figure 1. Wadhwani Ignite LMS Display in Entrepreneurship Courses

Source: <https://web.nen.wfglobal.org/en/all-program>

LMS-based learning is also considered to be able to accommodate various student learning styles (El-rumi, 2022). Wadhwani Ignite LMS gives students the freedom to choose a learning method that suits their individual characteristics and needs. In addition, the use of technology in learning allows students to develop from a dependent learning stage to a self-directed (Grow, 1991). In this condition, the role of lecturers is no longer the main information center, but rather as a facilitator who guides students in building their own knowledge and learning experiences (Li, Cevikbas & Kaiser, 2024).

Furthermore, LMS-based learning has a mission to foster a positive attitude towards the concept of lifelong learning, improve independent living skills, and motivate students to be able to actualize themselves responsibly in social and professional life (Castaneda, Montoya & Alexander, 2024). This approach emphasizes the importance of self-directed learning, collaboration, and the ability to solve real problems in everyday life. In LMS-based learning, students are required to actively build knowledge, find solutions to various problems, and connect theory with practice independently (Lee et al., 2024). Previous studies have demonstrated that Learning Management Systems can improve student engagement, learning outcomes, and self-regulated learning in various educational settings. However, limited research has specifically examined how integrating Self-Regulated Learning (SRL) strategies with an entrepreneurship-oriented LMS, such as Wadhwani Ignite, influences students' learning independence in entrepreneurship courses. In addition, most existing studies have focused on general online learning environments rather than specialized digital platforms designed to develop entrepreneurial competencies. This approach is expected to be able to develop aspects of independence, self-management, desire for learning, and problem-solving skills of students so that the learning process becomes more effective, interactive, and oriented towards 21st century competency development.

2. METHOD

This The research method used in this study is pre-experimental design with a one-group pretest-posttest design. This design was chosen to determine the effect of the application of SRL assisted by Wadhwani Ignite LMS in entrepreneurship courses on increasing student learning independence. The pre-experimental design was considered appropriate because the primary objective of this study was to evaluate the initial effectiveness of the proposed instructional intervention in an authentic classroom

setting. By comparing students' learning independence before and after the intervention within the same group, the design enables the direct observation of changes attributable to the implementation of SRL while minimizing the influence of individual differences among participants. Furthermore, all students enrolled in the entrepreneurship course were expected to receive the same learning experience as part of the regular curriculum, making the inclusion of a separate control group impractical and ethically less appropriate. Therefore, this design provides a suitable approach for generating preliminary empirical evidence regarding the effectiveness of the intervention and can serve as a foundation for future studies employing more rigorous experimental or quasi-experimental designs. In this design, the research subjects were given a pretest before the treatment to find out the initial condition of the student's learning independence, then given treatment in the form of the application of SRL assisted by Wadhwani Ignite LMS and then given a posttest to find out the changes that occurred after the treatment was given.

The research was carried out within Universitas Syiah Kuala. The research subjects were selected using a purposive sampling technique, with a total of 72 university students. The data collection technique was carried out using an instrument in the form of a questionnaire that was prepared to measure the level of student learning independence and determine the success of the implementation of SRL assisted by Wadhwani Ignite LMS in the learning process. The indicators of learning independence measured include students' ability to manage learning time, set learning goals, monitor the learning process, utilize web-based learning resources, and evaluate learning outcomes independently. The learning independence questionnaire consisted of 24 items distributed across these five indicators and employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Prior to data collection, the instrument was reviewed by experts to establish content validity and was subsequently tested in a pilot study. The questionnaire was subjected to item validity and reliability testing prior to data collection. Item validity was evaluated using corrected item-total correlation, and all items exceeded the recommended threshold of .30, indicating satisfactory construct validity. Reliability analysis showed excellent internal consistency, with a Cronbach's alpha coefficient of .91, demonstrating that the instrument was highly reliable for measuring students' learning independence. The total score was obtained by summing the responses to all items, with higher scores indicating a higher level of learning independence. In addition, a separate questionnaire consisting of 10 items was used to determine students' responses to the implementation of SRL assisted by the Wadhwani Ignite LMS during the lecture process.

The data obtained were then analyzed using a percentage technique to describe the level of student learning independence before and after treatment. Furthermore, to determine the increase in student learning independence after the implementation of SRL assisted by Wadhwani Ignite LMS, an analysis was carried out using a gain test. The results of the gain test were used to see the categories of improvement that occurred, so that the effectiveness of the implementation of SRL assisted by Wadhwani Ignite LMS in increasing student learning independence can be known.

3. RESULTS AND DISCUSSION

3.1 Results

The application of SRL assisted by Wadhwani Ignite LMS in entrepreneurship courses was carried out for seven meetings out of a total of 14 available materials, lecturers selected and adjusted materials that were relevant to the learning outcomes of entrepreneurship courses. The implementation of SRL assisted by Wadhwani Ignite LMS in this study is focused on four main aspects, namely learning independence, self-management, desire for learning, and problem-solving skills. In the learning process, students are given a wider opportunity to manage their learning process independently through various features available in Wadhwani Ignite LMS. The platform provides semester learning topics, digital teaching materials, assignments, quizzes, discussion forums, and various other supporting features that can be accessed anytime and anywhere. Each learning topic contains lecture materials that are systematically arranged in accordance with the semester learning plan, so that students can learn the material gradually according to their ability and learning speed.

The application of the aspect of learning independence can be seen from the demand for students to study the material independently before participating in lecture discussions. Students are directed to

find additional information, understand the concept of entrepreneurship, and complete assignments without relying entirely on the lecturer's explanation. In the aspect of self-management, students are accustomed to managing their learning schedules, completing assignments on time, and controlling their learning activities while participating in learning through Wadhwani Ignite LMS.

Furthermore, the aspect of desire for learning is applied through reflection and self-evaluation activities on the understanding of the material that has been studied. Students are encouraged to recognize their strengths and weaknesses in understanding the concept of entrepreneurship so that they can determine more effective learning strategies. Meanwhile, the problem-solving aspect is realized through assignments, case studies, and discussions that require students to think critically in finding solutions to various entrepreneurial problems related to real conditions in the field.

In this learning, the role of lecturers is no longer the main information center, but rather as a facilitator who guides, directs, and provides feedback on the student learning process. Lecturers assist students in utilizing the learning features in Wadhwani Ignite LMS and motivate students to be active in the learning process. In addition to learning independently, students can also interact and collaborate with other students through discussion forums to exchange opinions, discuss material, and complete group assignments together.

The learning evaluation process is carried out through quizzes, tests, and assignments available on Wadhwani Ignite LMS. This assessment system allows lecturers to monitor student learning progress more effectively, while students can find out their learning outcomes directly through the results of the evaluation displayed on the learning platform. In the implementation of the pretest, the maximum score that students may achieve is 100. Details of the frequency distribution of pretest scores are presented in Table 1.

Table 1. Pretest Score Results

Score Interval	Interpretation	Frequency	Percentage (%)
< 50	Very Less	7	9.72
50-59	Less	12	16.67
60-69	Enough	19	26.39
70-79	Good	17	23.61
80-89	Excellent	12	16.67
90-100	Special	5	6.94
Total		72	100

Based on the results of the pretest conducted on 72 students, a varied score distribution was obtained. Most students were in the score interval of 60-69 with a frequency of 19 students or 26.39%. Meanwhile, the least number of students is in the score interval of 90-100, which is 5 students or 6.94%. This shows that students initial abilities before the implementation of SRL assisted by Wadhwani Ignite LMS still need to be improved, especially in the aspects of learning independence and mastery of entrepreneurship materials. Details of the frequency distribution of posttest scores are presented in Table 2.

Table 2. Posttest Score Results

Score Interval	Interpretation	Frequency	Percentage (%)
< 54	Very Less	2	2.78
55 – 64	Less	6	8.33
65 – 74	Enough	13	18.06
75 – 84	Good	23	31.94
85 – 94	Excellent	19	26.39
95 – 100	Special	9	12.50
Total		72	100

The posttest results of 72 students, the distribution of scores showed an increase in learning outcomes after the implementation of SRL assisted by Wadhwani Ignite LMS. Most students are in the score interval of 75-84 with a frequency of 23 students or 31.94% who are included in the good category.

In addition, there were 19 students or 26.39% in the excellent category with a score interval of 85–94. The results show that most students have achieved good learning outcomes after participating in Wadhwani Ignite LMS-based learning.

After the data of the pretest and posttest results were obtained, the researcher conducted a gain test analysis to measure the increase in student learning independence after the implementation of learning. A comparison of the results of the gain test is presented in Table 3.

Table 3. Results of the Student Learning Independence Gain Test

Components	Pretest	Posttest	Gain	N-Gain	Category
Average Score	64.25	82.70	18.45	.52	Medium
Highest Score	93	98	5	.71	High
Lowest Score	42	52	10	.17	Low

3.1.1. N-Gain calculation

Based on the results of the gain test analysis, the average pretest score was 64.25 and the posttest average score was 82.70, resulting in an increase of 18.45 points. The results of the N-Gain calculation showed a value of .52 which was in the medium category. This shows that the implementation of SRL assisted by Wadhwani Ignite LMS is able to increase student learning independence in entrepreneurship courses quite effectively. The frequency distribution of n-gain test results is presented in Table 4.

The N-Gain formula used is:

$$\text{N-Gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Maximum Score} - \text{Pretest}}$$

Based on the calculation results:

$$\text{N-Gain} = \frac{82.70 - 64.25}{100 - 64.25} = .52$$

Table 4. Frequency Distribution of N-Gain Test Results

No	Interval N-Gain	Frequency	Percentage (%)	Category
1	< .30	11	15.28	Low
2	.30 - .70	46	63.89	Medium
3	≥ .70	15	20.83	High
Total		72	100	

Based on the results of the analysis of the N-Gain test on 72 students, it was found that most students were in the medium category with a total of 46 students or 63.89%. Furthermore, as many as 15 students or 20.83% were in the high category, while 11 students or 15.28% were in the low category. These results show that the implementation of SRL assisted by Wadhwani Ignite LMS is able to increase student learning independence in the medium to high category.

Increasing learning independence has been achieved by students in every aspect. Based on these results, students have been able to show learning independence with responsibility, the ability to plan their learning activities, analyze assignments and evaluate their learning outcomes. The results of the student learning independence gain test per aspect are presented in Table 5.

Table 5. Student Learning Independence Gain Test by Aspect

No	Aspects of Learning Independence	Pretest	Posttest	Gain	N-Gain	Category
1	Independence	63.10	81.40	18.30	.50	Medium
2	Self-Management	64.80	83.20	18.40	.52	Medium
3	Desire for learning	65.20	84.10	18.90	.54	Medium
4	Problem Solving	63.90	82.10	18.20	.50	Medium
Average		64.25	82.70	18.45	.52	Medium

Based on the results of the analysis of the gain test per aspect of student learning independence, all aspects have improved after the implementation of SRL assisted by Wadhwani Ignite LMS in entrepreneurship courses. The average pretest score of 64.25 increased to 82.70 in the posttest with a gain value of 18.45. The calculation results show an average N-Gain of .52 which is in the medium category. The desire for learning aspect obtained the highest N-Gain value of .54, while the learning independence and problem-solving aspects obtained an N-Gain value of .50. These results show that the application of SRL assisted by Wadhwani Ignite LMS is able to increase student learning independence in every aspect of SRL.

3.2 Discussion

From a theoretical perspective, these findings can be explained by Self-Regulated Learning theory, which posits that students become more independent when they actively engage in goal setting, strategic planning, self-monitoring, self-reflection, and self-evaluation throughout the learning process (Chung et al., 2021). Rather than relying on lecturers as the primary source of knowledge, students assume greater responsibility for directing and regulating their own learning (Kong & Lin, 2023). The LMS facilitates these self-regulatory processes by providing structured learning modules, flexible access to learning resources, formative assessments, assignments, discussion forums, and immediate feedback (Chou & Zou, 2020). These features encourage students to plan their learning activities, monitor their progress, evaluate their performance, and continuously improve their learning strategies, thereby strengthening their learning independence (Kleimola et al., 2025). In entrepreneurship education, this process is particularly important because entrepreneurial learning requires students to explore opportunities independently, solve authentic problems, make informed decisions, and apply theoretical knowledge in practical contexts (Aadland & Aaboen, 2020). Therefore, the integration of SRL with the LMS creates a learning environment that supports both self-regulation and the development of entrepreneurial competencies, ultimately leading to greater learning independence (Kong & Lin, 2023).

The results of this study show that the application of SRL assisted by Wadhwani Ignite LMS has a positive influence on increasing student learning independence in entrepreneurship courses. This improvement can be seen from students' better ability to manage the learning process, manage study time, complete assignments independently, and evaluate the learning outcomes that have been achieved. Through the application of SRL assisted by Wadhwani Ignite LMS, students not only become passive recipients of information, but also play an active role in controlling and directing their own learning process. The findings of this study are in line with the results of the research of Hazzam *et al.*, (2024); Ortega-Arranz *et al.*, (2024); Radović *et al.*, (2024) which states that digital-based learning is able to improve students' SRL abilities through strengthening aspects of self-management, learning motivation, and active involvement in learning. However, these findings differ from several previous studies that reported limited or insignificant effects of LMS implementation on students' learning independence when the technology was primarily used as a repository for learning materials or lacked structured self-regulated learning activities (Radović et al., 2024). These studies suggest that simply providing an LMS does not automatically promote independent learning; rather, the instructional design and pedagogical strategies embedded within the platform determine its effectiveness (Chou & Zou, 2020). The positive findings of the present study may therefore be explained by the integration of explicit SRL strategies with the Wadhwani Ignite LMS, which encouraged students to set learning goals, monitor their progress, participate in reflective learning activities, and receive continuous feedback throughout the learning process. This combination of pedagogical support and digital technology appears to have contributed to the improvement of students' learning independence in entrepreneurship education (Yot-Domínguez & Marcelo, 2017).

Independent learning basically does not mean that students learn completely on their own without the help of others. Independent learning emphasizes more on the ability of individuals to take responsibility for their own learning process, both individually and through social interaction in study groups and lecturer guidance. In this process, lecturers play the role of facilitators who provide direction, motivation, and feedback so that students are able to develop their learning potential optimally. This is supported by the research of Stap *et al.*, (2024) which explains that independent learning can still take place collaboratively through group discussions, academic cooperation, and active interaction between

students and lecturers. In the context of entrepreneurship education, this finding implies that lecturers should move beyond a teacher-centered approach by designing learning experiences that encourage students to identify business opportunities, develop innovative ideas, solve authentic entrepreneurial problems, and reflect on their learning progress (Farrokhnia et al., 2022). The Wadhwani Ignite LMS can support this process by providing structured learning pathways, project-based assignments, discussion forums, self-assessment activities, and continuous feedback that foster students' autonomy while maintaining appropriate instructional support.

Furthermore, independent learning is a learning process that is carried out on the basis of student initiative and self-awareness in identifying learning needs, setting learning goals, determining relevant learning resources, choosing appropriate learning strategies, and evaluating the learning outcomes that have been achieved (Arvatz et al., 2025). According to (Kang et al., 2024) this ability is an important indicator in SRL because students are required to be able to control all stages of learning systematically and in a directed manner. With good self-regulation skills, students will find it easier to adjust learning strategies to the learning needs and challenges they face. Practically, the findings of this study suggest that integrating SRL strategies with an entrepreneurship-oriented LMS can help higher education institutions cultivate entrepreneurial competencies, such as opportunity recognition, creativity, decision-making, problem-solving, and lifelong learning. Therefore, this instructional approach may serve as a practical model for entrepreneurship educators seeking to develop graduates who are more independent, adaptive, and prepared to respond to the dynamic demands of the entrepreneurial ecosystem (Bernadó & Bratzke, 2024).

The success of students in carrying out independent learning is greatly influenced by various internal factors, such as discipline, creativity, motivation, responsibility, and perseverance in learning (Arvatz et al., 2025). Students who have high learning discipline tend to be able to manage time effectively, maintain learning consistency, and complete academic assignments on time. In addition, creativity and perseverance in learning are also important factors that help students in facing various problems and challenges during the learning process. Research (Wu et al., 2024) shows that good self-regulation skills are closely related to increased thinking creativity, learning persistence, and academic success of students.

In order for the self-study program to run effectively and efficiently, students need to have good time management skills through the preparation of regular schedules of learning activities and discipline in carrying them out (Hsu et al., 2023). The preparation of a daily learning schedule helps students allocate time proportionally between activities to understand the material, complete assignments, discuss, and self-evaluate the learning progress that has been achieved (David et al., 2024). This is reinforced by research (Liptrot et al., 2024) which states that students who are used to systematically arranging learning schedules have a better level of learning independence and academic achievement than students who study without clear planning.

In the context of SRL assisted by Wadhwani Ignite LMS, students gain greater flexibility in accessing learning materials anytime and anywhere. Digital learning features such as online teaching materials, discussion forums, interactive quizzes, project-based assignments, and learning evaluations allow students to learn more actively, independently, and responsibly. This condition shows that the integration of technology in learning not only helps to improve understanding of entrepreneurship materials, but also forms the character of students who are more independent, disciplined, creative, and ready to face the challenges of academic life and the world of work in the future.

4. CONCLUSION

Based on the results of the research, it can be concluded that the implementation of Self-Regulated Learning assisted by the Wadhwani Ignite Learning Management System is able to increase student learning independence in entrepreneurship courses at Universitas Syiah Kuala. This increase can be seen from the results of the pretest and posttest which showed an increase in the average score of student learning independence from 64.25 to 82.70 with an N-Gain value of .52 which is included in the medium category. Increasing student learning independence occurs in all aspects of Self-Regulated Learning, namely learning independence, self-management, learning awareness, and problem solving. Through website-based learning, students become more active in managing the learning process, managing time,

finding learning resources, completing assignments independently, and evaluating the learning outcomes obtained. In addition, the use of digital learning features in Wadhvani Ignite LMS provides flexibility for students to learn anytime and anywhere, supporting the creation of more independent and student-centered learning. Thus, the implementation of website-based Self-Regulated Learning can be used as an alternative effective learning strategy to increase student learning independence, especially in entrepreneurship courses. In addition to improving learning outcomes, this approach is also able to shape the character of students who are more disciplined, responsible, creative, and ready to face academic challenges and the world of work in the digital era.

Theoretically, this study contributes to the growing body of knowledge on Self-Regulated Learning by providing empirical evidence that integrating SRL strategies with an entrepreneurship-oriented Learning Management System can effectively enhance students' learning independence. The findings also extend the application of SRL theory to the context of entrepreneurship education, where autonomous learning, self-management, and problem-solving are essential competencies. From a practical perspective, the findings suggest that entrepreneurship educators and higher education institutions can utilize the Wadhvani Ignite LMS as a pedagogical tool to design learning experiences that encourage students to become more self-directed, reflective, and actively engaged in entrepreneurial learning. Integrating structured SRL activities into LMS-based instruction may help foster entrepreneurial competencies that are relevant to the demands of the digital economy and lifelong learning. Nevertheless, this study has several limitations. First, it employed a pre-experimental one-group pretest-posttest design without a control group, limiting the ability to establish causal relationships. Second, the study was conducted at a single university with a relatively limited sample size, which may restrict the generalizability of the findings to other educational contexts. Future research is therefore recommended to employ quasi-experimental or true experimental designs involving larger and more diverse samples from multiple institutions. Further studies may also investigate the long-term effects of SRL-assisted LMS implementation and examine its impact on other outcomes, such as entrepreneurial intention, entrepreneurial competence, academic achievement, digital literacy, and collaborative learning skills.

REFERENCES

- Aadland, T., & Aaboen, L. (2020). An entrepreneurship education taxonomy based on authenticity. *European Journal of Engineering Education*, 45(5), 711–728. <https://doi.org/10.1080/03043797.2020.1732305>
- Arvatz, A., Peretz, R., & Dori, Y. J. (2025). Self-regulated learning and reflection: a tool for teachers and students. *Metacognition and Learning*, 20(1), 1–24. <https://doi.org/10.1007/s11409-025-09415-3>
- Bayly-Castaneda, K., Ramirez-Montoya, M. S., & Morita-Alexander, A. (2024). Crafting personalized learning paths with AI for lifelong learning: a systematic literature review. *Frontiers in Education*, 9(August), 1–12. <https://doi.org/10.3389/feduc.2024.1424386>
- Bernadó, E., & Bratzke, F. (2024). Revisiting EntreComp through a systematic literature review of entrepreneurial competences. Implications for entrepreneurship education and future research. *International Journal of Management Education*, 22(3). <https://doi.org/10.1016/j.ijme.2024.101010>
- Bittner, J. V., Stamov Roßnagel, C., & Staudinger, U. M. (2022). Educational self-regulation competence: toward a lifespan-based concept and assessment strategy. *International Journal for Educational and Vocational Guidance*, 22(2), 307–325. <https://doi.org/10.1007/s10775-021-09491-2>
- Chitra, E., Hidayah, N., Chandratilake, M., & Nadarajah, V. D. (2022). Self-Regulated Learning Practice of Undergraduate Students in Health Professions Programs. *Frontiers in Medicine*, 9(February), 1–11. <https://doi.org/10.3389/fmed.2022.803069>
- Chou, C. Y., & Zou, N. B. (2020). An analysis of internal and external feedback in self-regulated learning activities mediated by self-regulated learning tools and open learner models. *International Journal of Educational Technology in Higher Education*, 17(1). <https://doi.org/10.1186/s41239-020-00233-y>

- Chung, H. Q., Chen, V., & Olson, C. B. (2021). The impact of self-assessment, planning and goal setting, and reflection before and after revision on student self-efficacy and writing performance. *Reading and Writing*, 34(7), 1885–1913. <https://doi.org/10.1007/s11145-021-10186-x>
- David, L., Biwer, F., Crutzen, R., & de Bruin, A. (2024). The challenge of change: understanding the role of habits in university students' self-regulated learning. *Higher Education*, 88(5), 2037–2055. <https://doi.org/10.1007/s10734-024-01199-w>
- Defitrika, F., & Mahmudah, F. N. (2021). Development of Life Skills Education As Character Building. *International Journal of Educational Management and Innovation*, 2(1), 116. <https://doi.org/10.12928/ijemi.v2i1.3195>
- Edisherashvili, N., Saks, K., Pedaste, M., & Leijen, Ä. (2022). Supporting Self-Regulated Learning in Distance Learning Contexts at Higher Education Level: Systematic Literature Review. *Frontiers in Psychology*, 12(January). <https://doi.org/10.3389/fpsyg.2021.792422>
- El-rumi, U. (2022). *The development of students' self-regulated learning through online learning design*. 6(1). 53–67. Jurnal Kependidikan. <https://doi.org/https://doi.org/10.21831/jk.v6i1.44980>
- Farrokhnia, M., Baggen, Y., Biemans, H., & Noroozi, O. (2022). Bridging the fields of entrepreneurship and education: The role of philosophical perspectives in fostering opportunity identification. *International Journal of Management Education*, 20(2), 100632. <https://doi.org/10.1016/j.ijme.2022.100632>
- Galvis, Á. H., & Carvajal, D. (2022). Learning from success stories when using eLearning and bLearning modalities in higher education: a meta-analysis and lessons towards digital educational transformation. In *International Journal of Educational Technology in Higher Education*. 19(1). Springer International Publishing. <https://doi.org/10.1186/s41239-022-00325-x>
- Gambo, Y., & Shakir, M. Z. (2021). Review on self-regulated learning in smart learning environment. *Smart Learning Environments*, 8(1). <https://doi.org/10.1186/s40561-021-00157-8>
- Grow, G. O. (1991). Teaching Learners to be Self-Directed: A Stage Approach. *Adult Education Quarterly*, 41(3), 125–149. <https://longleaf.net/wp/wp-content/uploads/2021/03/SSDL.pdf>
- Håkansson Lindqvist, M., Mozelius, P., Jaldemark, J., & Cleveland Innes, M. (2024). Higher education transformation towards lifelong learning in a digital era—a scoping literature review. *International Journal of Lifelong Education*, 43(1), 24–38. <https://doi.org/10.1080/02601370.2023.2279047>
- Hazzam, J., Wilkins, S., Southall, C., & Ibrahim, B. (2024). The influence of LinkedIn group community on postgraduate student experience, satisfaction and grades. *Computers and Education*, 216(August), 105052. <https://doi.org/10.1016/j.compedu.2024.105052>
- Hsu, C. Y., Horikoshi, I., Li, H., Majumdar, R., & Ogata, H. (2023). Supporting “time awareness” in self-regulated learning: How do students allocate time during exam preparation? *Smart Learning Environments*, 10(1). <https://doi.org/10.1186/s40561-023-00243-z>
- Hyytinen, H., Nissinen, K., Kleemola, K., Ursin, J., & Toom, A. (2024). How do self-regulation and effort in test-taking contribute to undergraduate students' critical thinking performance? *Studies in Higher Education*, 49(1), 192–205. <https://doi.org/10.1080/03075079.2023.2227207>
- Kang, J., Zhou, Y., Rajarathinam, R. J., Tan, Y., & Shaffer, D. W. (2024). Unveiling joint attention dynamics: Examining multimodal engagement in an immersive collaborative astronomy simulation. *Computers and Education*, 213(February), 105002. <https://doi.org/10.1016/j.compedu.2024.105002>
- Karatas, K., & Arpaci, I. (2021). The role of self-directed learning, metacognition, and 21st century skills predicting the readiness for online learning. *Contemporary Educational Technology*, 13(3). <https://doi.org/10.30935/cedtech/10786>
- Keane, C. A., Miller, L. M., Eady, M. J., & Green, C. A. (2022). SETTLE DOWN: Preliminary investigations and development of an online toolkit to support student self-regulation in higher education. *Frontiers in Education*, 7(November), 1–13. <https://doi.org/10.3389/feduc.2022.957328>
- Kleimola, R., Hirsto, L., & Ruokamo, H. (2025). Promoting higher education students' self-regulated

- learning through learning analytics: A qualitative study. *Education and Information Technologies*, 30(4), 4959–4986. <https://doi.org/10.1007/s10639-024-12978-4>
- Klimova, B., Zamborova, K., Cierniak-Emerych, A., & Dziuba, S. (2022). University Students and Their Ability to Perform Self-Regulated Online Learning Under the COVID-19 Pandemic. *Frontiers in Psychology*, 13(March), 1–10. <https://doi.org/10.3389/fpsyg.2022.781715>
- Kong, S. C., & Lin, T. (2023). Developing self-regulated learning as a pedagogy in higher education: An institutional survey and case study in Hong Kong. *Heliyon*, 9(11), e22115. <https://doi.org/10.1016/j.heliyon.2023.e22115>
- Lahdenperä, J., Rämö, J., & Postareff, L. (2022). Student-centred learning environments supporting undergraduate mathematics students to apply regulated learning: A mixed-methods approach. *Journal of Mathematical Behavior*, 66(February). <https://doi.org/10.1016/j.jmathb.2022.100949>
- Lee, H. Y., Chen, P. H., Wang, W. S., Huang, Y. M., & Wu, T. T. (2024). Empowering ChatGPT with guidance mechanism in blended learning: effect of self-regulated learning, higher-order thinking skills, and knowledge construction. *International Journal of Educational Technology in Higher Education*, 21(1). <https://doi.org/10.1186/s41239-024-00447-4>
- Li, J. (2021). Learner-centred learning tasks in higher education: A study on perception among students. *Education Sciences*, 11(5). <https://doi.org/10.3390/educsci11050230>
- Li, R., Cevikbas, M., & Kaiser, G. (2024). Mathematics teachers' beliefs about their roles in teaching mathematics: orchestrating scaffolding in cooperative learning. *Educational Studies in Mathematics*, 117(3), 357–377. <https://doi.org/10.1007/s10649-024-10359-9>
- Liptrot, E., Pearson, H. A., Montazami, A., & Dubé, A. K. (2024). Why this app? How user ratings and app store rankings impact educators' selection of educational apps. *Computers and Education*, 218(November). <https://doi.org/10.1016/j.compedu.2024.105080>
- Malaikosa, Y. M. L., Widyadharma, A. P., & Pangestu, W. T. (2022). Curriculum and learning management: Integration of creative economy value to improve students' life skill. *Jurnal Pendidikan Vokasi*, 12(1), 76–85. <https://doi.org/10.21831/jpv.v12i1.44253>
- Meutia, T. O., Dwikurnaningsih, Y., & Satyawati, S. T. (2024). Strengthening Character Education Modules for Teachers to Improve the Work Character of Vocational High School Students. *Indonesian Values and Character Education Journal*, 6(2), 182–194. <https://doi.org/10.23887/ivcej.v6i2.67318>
- Murphy, L., Eduljee, N. B., & Croteau, K. (2021). *Teacher-Centered Versus Student-Centered Teaching: Preferences and Differences Across Academic Majors*. 4(1) <https://doi.org/10.36021/jethe.v4i1.156>
- Ortega-Arranz, A., Amarasinghe, I., Martínez-Monés, A., Asensio-Pérez, J. I., Dimitriadis, Y., Corrales-Astorgano, M., & Hernández-Leo, D. (2024). Collaborative activities in hybrid learning environments: Exploring teacher orchestration load and students' perceptions. *Computers and Education*, 219(May), 1–14. <https://doi.org/10.1016/j.compedu.2024.105105>
- Radović, S., Seidel, N., Menze, D., & Kasakowskij, R. (2024). Investigating the effects of different levels of students' regulation support on learning process and outcome: In search of the optimal level of support for self-regulated learning. *Computers and Education*, 215(February). <https://doi.org/10.1016/j.compedu.2024.105041>
- Schweder, S., & Raufelder, D. (2022). Examining positive emotions, autonomy support and learning strategies: Self-directed versus teacher-directed learning environments. *Learning Environments Research*, 25(2), 507–522. <https://doi.org/10.1007/s10984-021-09378-7>
- Symonds, E. (2021). An 'unavoidable' dynamic? Understanding the 'traditional' learner–teacher power relationship within a higher education context. *British Journal of Sociology of Education*, 42(7), 1070–1085. <https://doi.org/10.1080/01425692.2021.1962246>
- Taranto, D., & Buchanan, M. T. (2020). Sustaining Lifelong Learning: A Self-Regulated Learning (SRL) Approach. *Discourse and Communication for Sustainable Education*, 11(1), 5–15. <https://doi.org/10.2478/dcse-2020-0002>
- Thwe, W. P., & Kálmán, A. (2024). Lifelong Learning in the Educational Setting: A Systematic Literature Review. *Asia-Pacific Education Researcher*, 33(2), 407–417. <https://doi.org/10.1007/s40299-023-00738-w>

-
- Urbina, S., Villatoro, S., & Salinas, J. (2021). Self-regulated learning and technology-enhanced learning environments in higher education: A scoping review. *Sustainability (Switzerland)*, 13(13). <https://doi.org/10.3390/su13137281>
- Van der Stap, N., van den Bogaart, T., van Ginkel, S., Rahimi, E., & Versendaal, J. (2024). Towards teaching strategies addressing online learning in blended learning courses for adult-learners. *Computers and Education*, 219(February), 105103. <https://doi.org/10.1016/j.compedu.2024.105103>
- Wu, J. Y., Liao, C. H., Tsai, C. C., & Kwok, O. M. (2024). Using learning analytics with temporal modeling to uncover the interplay of before-class video viewing engagement, motivation, and performance in an active learning context. *Computers and Education*, 212(November), 104975. <https://doi.org/10.1016/j.compedu.2023.104975>
- Yot-Domínguez, C., & Marcelo, C. (2017). University students' self-regulated learning using digital technologies. *International Journal of Educational Technology in Higher Education*, 14(1). <https://doi.org/10.1186/s41239-017-0076-8>
- Zhu, M., & Doo, M. Y. (2022). The relationship among motivation, self-monitoring, self-management, and learning strategies of MOOC learners. *Journal of Computing in Higher Education*, 34(2), 321–342. <https://doi.org/10.1007/s12528-021-09301-2>
- Zimmerman, B. J. (2002). *Becoming a self-regulated learner: An overview*. *Theory Into Practice*, 41(2), 64–70. https://doi.org/10.1207/S15430421TIP4102_2.